



## WELCOMES YOU TO SUGARING WITH A *SUGAR CUBE ZB™*

The Vermont Evaporator Company's *Sugar Cube ZB* is designed for the backyard sugaring enthusiast with 5 to 100 taps.

Although the *Sugar Cube ZB* is small, it will save you hours of boiling sap and allow you to boil when it's convenient for you. The *Sugar Cube ZB* is a reverse osmosis machine that also includes a UV filter. In operation, the *Sugar Cube ZB* will separate water from your raw sap, thereby increasing the sugar concentration of the sap that you'll boil into syrup. The inclusion of the UV filter allows you to sterilize the yeast and bacteria in the sap (otherwise, yeast and bacteria would eventually eat the sugar in the sap and leave you with nothing to process). With the *Sugar Cube ZB*, you can store your concentrated sap longer and more conveniently while waiting for the right time to boil.

We hope you get many years of enjoyment from your *Sugar Cube ZB*. Here's how to start!

### A Note On Responsible Use

The *Sugar Cube ZB* is intended for use by individuals who have become knowledgeable regarding the reverse osmosis process as it relates to maple syrup production. **Follow all instructions and use reasonable care when utilizing the *Sugar Cube ZB*.** Possible hazards include, but are not limited to:

- **Shock/Electrocution** – Always use a ground fault outlet and surge protector. Always wear shoes and keep electrical cord away from wet/moist surfaces. Always run discharge hoses into containers. Never allow them to spill onto nearby surfaces. If spillage occurs, find a way to safely unplug the unit and dry the unit and the surrounding area before plugging back in.
- **Fire** – Do not use the product in potentially explosive, flammable, or corrosive environments. Do not disassemble or alter the pump or transformer.
- **Physical Hazards** – The product works under high pressure. Always wear safety goggles and point

hoses away from your body and face.

- **Leaks** – Closely monitor the operation of the product. Regularly inspect and repair any components that are leaking.

**In no event can we at Vermont Evaporator Company be liable for any direct, indirect, punitive, incidental, special or consequential damages to property or life whatsoever arising out of or connected with the use or misuse of our products.**

### Understanding your *Sugar Cube ZB*

What is your *Sugar Cube ZB* made of and how can you expect it to perform? Here are the basics\*:

<b>Ideal Tap Number</b>	The <i>Sugar Cube ZB</i> can work for a <b>hobby of any size</b> . We recommend it for operations of <b>5-100 taps</b> .
<b>Capacity</b>	At typical sap temperatures, the <i>Sugar Cube ZB</i> processes up to <b>8 gallons</b> of sap <b>per hour</b> .
<b>Concentrate Production</b>	At typical sap temperatures, the <i>Sugar Cube ZB</i> produces up to <b>4 gallons</b> of sap concentrate <b>per hour</b> .
<b>Number of Membranes</b>	The <i>Sugar Cube ZB</i> has <b>1 reverse osmosis membrane</b> with the capacity to process <b>400 gallons of sap per day</b> .
<b>Pump Rating</b>	The <i>Sugar Cube ZB</i> 's pump is rated to process <b>300+ gallons</b> of sap <b>per day</b> .
<b>Power Consumption</b>	The <i>Sugar Cube ZB</i> runs at <b>110 VAC</b> .
<b>UV Filter</b>	The <i>Sugar Cube ZB</i> 's UV filter sterilizes yeast and bacteria for longer pre-boil storage.

*\*Specifications are based on a 2% sugar solution and achievement of a 50% reduction in water content in sap. Actual concentrate production will be impacted by a number of factors, including, but not limited to: temperature of sap, age of reverse osmosis membranes, and location of the Sugar Cube ZB relative to raw sap storage container and sap concentrate storage container.*

### Preparing your *Sugar Cube* for Use

Your *Sugar Cube* needs little set-up. Open the carrying case. You will see:

- one reverse osmosis filter (to go in white housing),
- one sediment filter (to go in blue housing),
- one filter housing wrench,
- one length of white hose,
- one length of blue hose,
- one length of red hose,
- one needle valve.

Take all of these things out of the carrying case. Then take a picture of what remains in the carrying case for your reference. Take the filters out of their packaging.

Remove the two filter housings from the *Sugar Cube*. In order to do this, you may have to release the filter housings from the tubing using the push-to-connect fittings. To disconnect the filter housings from the tubing, push down on the plastic ring (“collet”) surrounding the tubing at each fitting and hold while pulling tubing out. To reconnect, firmly push the tubing back into the fitting. To see a YouTube demonstration of how to use a push to connect fitting, visit <https://bit.ly/4i5h6sH>.

Unscrew the caps of the filter housings using the filter housing wrench. Take the reverse osmosis filter out of its plastic packaging. Place the reverse osmosis filter into the white filter housing so that the end of the filter with the rubber seal goes in last. Take the sediment filter out of its plastic packaging. Place the sediment filter into the blue filter housing. Screw the caps back on the filter housings and reconnect to the tubing using the photograph you took as reference.

Set aside the filter housing wrench, and locate the lengths of white, blue and red hose. Turn the *Sugar Cube* so that you are looking at the outside of its right side. Insert the white hose into the fitting labeled “sap in.” Insert the blue hose into the fitting labeled “sap concentrate out.” Insert the red hose into the fitting labeled “water out.” Your *Sugar Cube* is all set up and ready to go!

**IMPORTANT:** do not let your *Sugar Cube* freeze after you’ve used it – frozen water will destroy the filters and may crack fittings and/or the tubing.

## Operating your *Sugar Cube*

### First Operation:

- Place your *Sugar Cube* on a slightly elevated surface such that it is not directly on the ground (on a table, milk crate, etc.).
- Fill a 5-gallon bucket with clean water. This can be well water, permeate water, distilled water or spring water. **Do not use municipal water or water containing chlorine.**
- Place the loose end of the white hose into the bucket of clean water.
- Put the loose end of the blue hose into a second bucket (or wherever you prefer to dispose of water after it runs through the system).
- Put the loose end of the red hose into the bucket of clean water.
- Unwind both power cords and plug into a power source. Let the *Sugar Cube* run until all the clean water has gone through the system and the blue hose is blowing air.
- Your unit was tested for leaks by the manufacturer. However, while the unit is running, you will want to check for any leaks that developed during the shipping process. If a large leak is found, turn off the unit and tighten the fitting slightly (be careful as the plastic fittings can break). Turn the unit back on. If the leak returns, turn off the unit, remove the fitting, wraps several turns of Teflon tape around the threads and reinstall.
  - Note: A small amount of leaking (~1 cup per hour) is acceptable. The *Sugar Cube* has drain

holes that will allow small quantities of liquid to exit the *Sugar Cube*. It's big, obvious leaks that you are looking for.

### Concentrating Sap:

- Place the *Sugar Cube* on a slightly elevated surface off of the ground.
- Open the *Sugar Cube* and unwind both power cords.
- Put the loose end of the white hose into your sap storage container.
  - For best results, arrange your sap storage container such that it is higher than your *Sugar Cube*.
- Install the needle valve. The needle valve goes in-line with the blue hose. Thus, cut the blue hose (a sharp utility knife or tubing cutter work best) where it is convenient for your operation (either closer to the Sugar Cube ZB or closer to where your sap receptacle is).
- Insert the loose end coming from the Sugar Cube ZB into one side of the needle valve and insert an end of the other unconnected piece of blue hose into the other side of the need valve.
- Put the loose end of the blue hose into your sap storage container.
- Put the loose end of the red hose into your sap storage container.
- Plug the power cords into a power source.
- Let the *Sugar Cube* run until liquid comes out of the blue hose.
- Slowly close the needle valve located at the end of the blue hose (it may take many turns). After about 15 to 30 seconds, you should see liquid coming out of the red hose. You will also hear the pump change pitch, which indicates an increase in pressure in the system.
- Continue adjusting the needle valve until the amount of liquid coming out of the blue and red hoses is about equal.
  - Note: It is best NOT to constrict the flow such that the amount of concentrate is *significantly less* than the amount of clean water coming out. This can damage the filters, shorten the life of the pump, and have other undesirable consequences to your *Sugar Cube's* operation.
  - A single pass through the *Sugar Cube* should about double your sap concentration (e.g., 2% to 4%). If desired, you can run this concentrated sap through the *Sugar Cube* again – thereby removing 75% of the water. For example, if you have 2% sap, the first pass would give you about 4% concentrate, and a second pass would give you about 8% concentrate.
- Put the loose end of the red hose in a clean, 5-gallon bucket. Clean, permeate water is now coming out of the red hose. (Fill up at least two, 5-gallon buckets with permeate water for flushing the unit later; the remaining water can be discarded.)
- Put the loose end of the blue hose in the container in which you would like to store your concentrated sap.
  - Note: Because of the UV filter, this sap can be stored for an extended amount of time before boiling. In a test conducted by the Vermont Evaporator Company, concentrated sap was stored in a sanitized container at 40° Fahrenheit for 2 weeks with no measurable degradation in sap quality.
- Run the *Sugar Cube* until all of your raw sap has been processed and the blue hose is blowing air.

Note: Although the pump supplied with the *Sugar Cube* can be run “dry,” prolonged operation of the pump

without liquid will potentially damage the pump.

### **Maintaining your Sugar Cube**

The filters inside your *Sugar Cube ZB* have varying life expectancies. The UV filter is designed to last throughout the life of your unit and beyond. The consumable filters inside your *Sugar Cube ZB*---the sediment and reverse osmosis filters---have a limited lifespan.

Many factors, including sugar concentration, sap quality, temperature, and time, can affect the replacement cadence for sediment and reverse osmosis membranes. Here are some general guidelines for how frequently you should replace your sediment and reverse osmosis filters:

**Sediment Filters** – While sediment filters are designed to be a single use filter, if adequately flushed and refrigerated between uses, sediment filters can last for a week or more. Sediment filters usually need to be discarded due to bacterial growth; discolored filters or filters with an off smell should be discarded no matter how long they have been used. If processing large amounts of sap continuously, change your sediment filter every 300 gallons.

**Reverse Osmosis Filters** – Reverse Osmosis filters can be used for up to two years if properly cared for per the below.

Leaving residual sap in your *Sugar Cube* can result in a fouling of the system, producing off-flavors, inefficient processing and potentially mold and bacteria growth. After each use, you'll want to flush the system, and, if the unit is not going to be used for an extended period and at the end of the season, thorough cleaning is necessary.

1. After each use if you are going to use the unit again the next day:

- Remove your white hose from the sap container and allow the unit to “run dry” (the blue hose will be blowing air).
- Put the loose end of the white hose into a 5-gallon bucket of clean water. “Clean water” means well water, permeate water, distilled water or spring water. **Do not use municipal water or water containing chlorine.** Open the needle valve on the blue hose completely (so that no water comes out of the red hose). Put the loose end of the blue hose into the clean bucket of water. Run the *Sugar Cube* for 15 minutes.
- After 15 minutes, remove the white hose from the bucket of clean water. Allow the Sugar Cube ZB to “run dry” (the blue hose will be blowing air). Discard the permeate water. (It is no longer “clean” for purposes of flushing your unit.)
- Remove the sediment filter, empty the contents of the sediment filter housing, and leave the sediment filter housing open and dry. Save the sediment filter in the refrigerator for future use.
- Keep your *Sugar Cube* in a cool, dry place. DO NOT allow it to FREEZE.

2. After each use if you are going to use the unit again within a week:

- Remove your white hose from the sap container and allow the unit to “run dry” (the blue hose will be blowing air).
- Remove the sediment filter, empty the contents of the filter housing, and install a new sediment filter. Reinstall the filter housing. Save the old sediment filter in the refrigerator for future use

concentrating sap with the *Sugar Cube ZB*. (You will save the second sediment filter in the refrigerator and use it only when flushing the *Sugar Cube ZB*.)

- Put the loose end of the white hose into a 5-gallon bucket of permeate/clean water. **Do not use municipal water or water containing chlorine.** Open the needle valve on the blue hose completely (so that no water comes out of the red hose). Run approximately one gallon of the water through the *Sugar Cube ZB*, discarding the gallon of water into another bucket as you go. Then, put the loose end of the blue hose into the clean bucket of water and let the remaining 4 gallons of water continuously circulate through the *Sugar Cube* for 15 minutes.
  - After 15 minutes, remove the white hose from the bucket of clean water. Allow the *Sugar Cube ZB* to “run dry” (the blue hose will be blowing air). Discard the 4 gallons of permeate water. (It is no longer “clean” for purposes of flushing your unit.)
  - Place the white hose into a NEW 5-gallon bucket of permeate/clean water (**Do not use municipal water or water containing chlorine.**) and let it run through the unit. Unplug the unit before it runs dry.
  - Remove the new sediment filter from the filter housing, empty the housing of water, and leave it open until the next use. Save the new sediment filter in the refrigerator for future use flushing the *Sugar Cube ZB*.
  - Keep your *Sugar Cube* in a cool, dry place. DO NOT allow it to FREEZE.
3. After each use if you aren't going to use the unit again for more than a week:
- Flush the *Sugar Cube ZB* according to the directions in #2, above.
  - Once per week, run 5 gallons of permeate/clean water through the unit using the sediment filter you have reserved for flushing. **Do not use municipal water or water containing chlorine.**
4. After the last use of the season:
- Flush the *Sugar Cube ZB* according to the directions in #2, above.
  - Prepare two gallons of permeate/clean water. **Do not use municipal water or water containing chlorine.** Heat to 105-115 degrees Fahrenheit. DO NOT OVERHEAT; HOTTER TEMPERATURES COULD CAUSE AN EXPLOSIVE LEAK IN YOUR UNIT. Dissolve 1 teaspoon of RO Soap from our *RO Cleaning Kit* in the water at a time until the PH of the solution is approximately 11. This should take 1 to 3 teaspoons; the amount you need to use will depend upon the acidity of the water you are using. Recirculate the solution through the *Sugar Cube ZB* for 15 minutes by placing both the white and blue hoses in the gallon of solution. (Nothing should be coming out of the red hose.)
  - After 15 minutes, check the PH and temperature of the solution. If it has cooled below 100 degrees, heat it back up to 105-115. If the PH has dropped significantly, add some more RO soap until the PH of the solution is back up to 11.
  - Recirculate the solution for another 15 minutes, turn the unit off and let it sit for at least a few hours and up to a day.
  - Pull the white hose out of the solution and allow the unit to run dry. Insert the white hose into a 5-gallon bucket of clean water and rinse the system for 2 minutes, discarding the water as you go (do not recirculate). **Do not use municipal water or water containing chlorine.** Remove the sediment filter and reverse osmosis filter. Discard the season's sediment filters. You may save the reverse

osmosis filter in your refrigerator for a second year of use.

- Disconnect the white, red and blue hoses from the *Sugar Cube* and hang or use compressed air to dry. Wipe out any liquid inside and outside the *Sugar Cube*.
- Store your *Sugar Cube* in a cool, dry place. DO NOT allow it to FREEZE.

Next Season:

- Inspect all parts.
- Follow the steps above for “First Operation,” running enough clean water through your unit such that the discharged water has a pH of 7 before running sap through your *Sugar Cube ZB*. This may take 20 or 30 gallons of clean water. This can be well water, permeate water, distilled water or spring water. **Do not use municipal water or water containing chlorine.**

If you have improperly maintained your *Sugar Cube ZB*:

- Don’t panic!
- Follow the instructions for “After the last use of the season,” above, followed by the instructions for “Next Season” below that.
- Carry on!